



THE ECONOMIC ENGINE

OF BIOTECHNOLOGY IN ILLINOIS

SPECIFIC METHODOLOGIES USED FOR THIS REPORT

The Midwest Super Cluster: The nine-state cluster of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio and Wisconsin

Comparative Clusters: California, Texas and the East Coast (Massachusetts, New Jersey and Pennsylvania)

Primary Research: Direct interviews with senior industry leaders throughout the Midwest region

Secondary Research: Previous reports by Battelle Memorial, information from the Bureau of Labor Statistics, the National Science Foundation, various university technology transfer offices, biotechnology organizations, publicly available data sources and reports as well as proprietary databases

Industry Segments:

- Agricultural Feedstock & Chemicals
- Medical Devices & Equipment
- Drugs & Pharmaceuticals
- Research, Testing & Medical Laboratories
- Biotechnology-Related Distribution

All figures based on 2011 data available at time of study, unless otherwise specified. For further details, see Appendix.



LETTER FROM ILLINOIS GOVERNOR PAT QUINN

World Biotechnology Professionals:

The State of Illinois, along with the great states of the Midwest region, has long appreciated our world-class bioscience resources. What may not have been realized is that these resources cover the entire spectrum of the industry-sector categories, including agriculture feedstock and chemicals, drugs and pharmaceuticals, medical devices and equipment, research, testing and medical laboratories as well as bioscience-related distribution.

Illinois has been selected to host not just one or two, but four BIO International Conventions within a 10-year span. These past Chicago conventions, with nearly 35,000 biotechnology business professionals attending from over 65 countries and 49 states, allowed a global bioscience audience to discover the magnificent capabilities available in the Midwest States to feed, fuel and heal the world.

This report, "The Economic Engine of Biotechnology in Illinois," is especially powerful in taking another step in formally measuring how vibrant and impactful this industry is for our state and the region. And, as the economic impact of the bioscience sector becomes clearer through this type of analysis, we become especially proud to be a key player in the dynamic, thriving and growing Midwest biotech cluster. However, what I find most exciting about this report is that, as successful as the industry has been over the last 20 years, Illinois and the Midwest are poised to continue to drive innovation and advancement in the biosciences for the next two decades, and well beyond.

Sincerely,

A handwritten signature in black ink that reads "Pat Quinn".

Pat Quinn
Governor, State of Illinois

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WELCOME TO THE INNER WORKINGS OF MIDWEST BIOTECHNOLOGY

An Introduction to This Report

While there have been previous attempts to assess the depth and diversity of the biotechnology business sector in the Midwest in general, and Illinois in particular, most have fallen short of effectively communicating the full size of the industry, its economic impact on the people involved in it and the financial contributions it makes to local and regional economies and governments.

One reason why some of these efforts have yielded less-than-optimal results is the difficulty of addressing the fact that the Illinois and Midwest biotechnology market is an exceptionally dynamic community that is both geographically and industrially diverse.

The goals?

- To address this considerable challenge, professional services firm Ernst & Young was commissioned to conduct an in-depth analysis of biotechnology in Illinois and the Midwest.
- To move beyond previous efforts and more successfully both qualify and quantify the tangible business values that biotechnology and life sciences activities represent in Illinois and the Midwest.

What is the benchmark for the current position of the industry?

What framework should be used to address real-world trends to better inform business strategy development, public policy and engagement in industry and research initiatives?

Some of the key answers that were revealed include:

- An accurate profile of the size and scope of the activity and the impact of industry and academic biotechnology activities in Illinois and the Midwest.
- A compelling comparison of how Illinois and the Midwest stack up against other states and clusters arguably better known for their biotechnology achievements.
- An informative analysis of historical business growth trends, together with a glimpse into future opportunities for the region.

Through a series of in-depth interviews with industry leaders, combined with a thorough analysis of the data, statistics and metrics from dozens of independent sources, an enlightening picture of the vibrant economic engine of biotechnology in Illinois and the Midwest Super Cluster began to take shape.

THE ECONOMIC ENGINE AT A GLANCE

“At the heart of the Midwest Super Cluster, Illinois boasts the largest number of bioscience companies...”

Topline Results

Ask most people what the most active area of the country is for biotechnology and the answer will often be the same: California and the East Coast. Both clusters are well known for the size and significance of their growing contributions to the industry.

But with **more than 377,900 employees in more than 16,800 establishments, the nine-state Midwest Super Cluster is actually much larger.** By comparison, California employs some 230,000 people among about 7,500 establishments, and the East Coast cluster employs 253,000 among 7,100 establishments.

In addition to its size, the Midwest is a leader in biotechnology research, development and academic activities. This Midwest Super Cluster is also the most balanced of biotechnology regions in the United States, in terms of employing a large number of people and maintaining an impactful presence in all sectors of the industry.



A SNAPSHOT OF THE ECONOMIC IMPACT OF ILLINOIS BIOTECHNOLOGY



- \$98.6 Billion in Economic Output—52.4 Direct, 46.2 Indirect/Induced
- 81,000 Direct Jobs, 288,000 Indirect/Induced, for a total of 369,000
- 3,572 Illinois Biotech Companies



- Nearly \$2.9 Billion in Total State and Local Tax Revenue—
1.1 Billion Direct, 1.8 Indirect/Induced

At the heart of the Midwest Super Cluster, Illinois boasts the largest number of bioscience companies and is leading the way in terms of the number of establishments overall (from the corporate world to that of academics), people employed, corporate profitability, employee wages and overall growth.

In addition, of the 14 states that were considered for comparison in this analysis (including those within the Midwest Super Cluster), Illinois ranked among the top three in each of these vital categories:

- Number of biotechnology establishments.
- Company revenue overall.
- Company revenue growth.
- Federal agency growth in R&D expenditures, including NIH grants.

Specifically, based on this analysis, Illinois stands out as a significant player in the biotechnology industry in three very distinct ways:

1. It is at the core of the most vibrant bioscience cluster in the United States.
2. The biotechnology industry in Illinois is a critical component and driver of the State's economy.
3. The community is committed to fueling this growth, actively investing in innovative programs and ventures to keep advancing the biotechnology industry.

What's behind these numbers and the rankings? In order to truly understand them and their implications for Illinois and the Midwest, five key areas offer the most meaningful insight:

1. The Midwest Super Cluster.
2. Economic Indicators, Influence and Impact.
3. Employment and Job Creation.
4. Academia and Industry.
5. Entrepreneurial and Startup Efforts.

Taking a closer look at each of these areas helps clarify why the business of biotechnology in Illinois and the Midwest is, in fact, second to none.

A LOOK INSIDE THE MIDWEST SUPER CLUSTER

Illinois: The Central Component

The Midwest Super Cluster, taken as a whole, represents the largest collection of biotechnology activities in the United States. At the core of this cluster, Illinois biotechnology is a strong driver of the industry's vitality and growth, and its proximity to other states in the region facilitates this growth overall while also strengthening the industry contributions of Illinois itself.

The Midwest Super Cluster

The Midwest Super Cluster is comprised of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio and Wisconsin. In many ways, Illinois leads much of the industry's growth and economic contributions.

BIOTECHNOLOGY ACTIVITIES: A CROSS-COUNTRY COMPARISON				
	Midwest Super Cluster	Illinois	California	East Coast Cluster
Employment (2011)	377,924	81,115	230,177	253,236
Establishments (2011)	16,856	3,572	7,543	7,117
Research/Development Expenditures (2010)	\$6,589M	\$608M	\$4,708M	\$3,711M
NIH Research/Development Expenditures (2011)	\$3,424M	\$708M	\$2,542M	\$2,359M

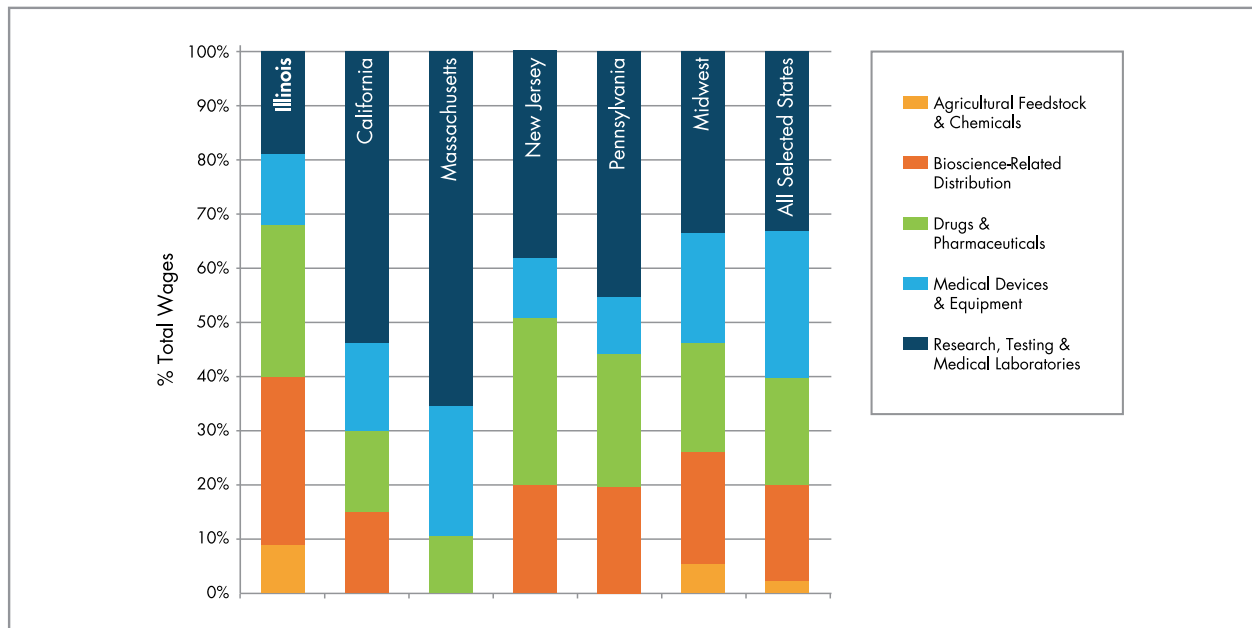


MORE THAN 15,500 BIOTECHNOLOGY ESTABLISHMENTS

In the Midwest, all within 400 miles of Chicago

Within 400 miles of Chicago alone, there are more than 15,500 biotechnology establishments employing more than 360,000 people. The Midwest Super Cluster is the most diverse and balanced—with employment distributed almost equally between the bioscience industry segments.

Bioscience Employment Segmentation by Selected States



Illinois is one of the most balanced states in terms of bioscience employment and wages by industry segment.

Each state in the Midwest Super Cluster has different strengths:

- **Ohio and Wisconsin:** feature strong startup communities.
- **Minnesota, Michigan and Indiana:** are leading centers for medical device and diagnostic companies.
- **Illinois:** is the most balanced state between industry subsectors and hosts the largest concentration of biopharma companies outside of the Pennsylvania/New Jersey region.
- **Missouri, Kansas and Iowa:** are home to large agricultural, industrial and research companies.

Taken together, the contributions of these states have resulted in significantly higher levels of biotechnology activities as compared to the state frequently considered the benchmark of the industry: California.



3,572 ILLINOIS BIOTECH COMPANIES

Largest sector: Drugs & Pharmaceuticals

There are a number of organizations and initiatives in place to support this cooperative spirit:

— **Midwest Research University Network (MRUN)**

As a Midwest alliance of university business development professionals, accelerators and early stage investors, MRUN is dedicated to facilitating growth of technology and research-based spinout companies through startup formation. MRUN focuses on a belief that regional cooperation fosters commercialization of university research and new venture growth.

— **Midwest Council of State Biotech Associations and Coalition of State Bioscience Institutes (CSBA/CSBI)**

CSBA/CSBI is a collaboration of industry groups and institutes, working together to provide best practices in assisting the industry in continued business growth, increased business startups and an improved STEM education climate.

— **Midwest Governors Association (MGA)**

The Midwest Governors Association is a non-profit, bipartisan organization that brings together governors and their staffs to address public policy issues of significance to the region. The MGA gives governors the opportunity to foster regional development and attain greater efficiency in state administration. In addition, it coordinates the presentation of a cohesive regional agenda before Congress and the Federal government to facilitate the exchange of views and experiences on subjects of importance to the people of Midwestern states.

— **Mid-America Healthcare Investors Network (MHIN)**

The Mid-America Healthcare Investors Network, founded in 2002, consists of more than 35 venture capital firms interested in the life sciences sector in the Midwest and surrounding states. The group focuses on early-stage financing and includes funds with a minimum of \$10 million in callable capital. The MHIN encourages the syndication of financing for healthcare-related companies in the Midwest, promotes the sharing of expertise and experience among member firms and urges the investment of valuable resources into industry growth.

What fuels the engine of the Midwest Super Cluster is that it is not solely a collection of individual states. Its economic power and potential result from the ability and enthusiasm with which establishments in the region work together.

“The Midwest Super Cluster. A group of nine states, each with unique capabilities and unique contributions...”

ASSESSING ECONOMIC INDICATORS, INFLUENCE AND IMPACT

Biotechnology: Fuel for Economic Well-Being



\$98.6 BILLION

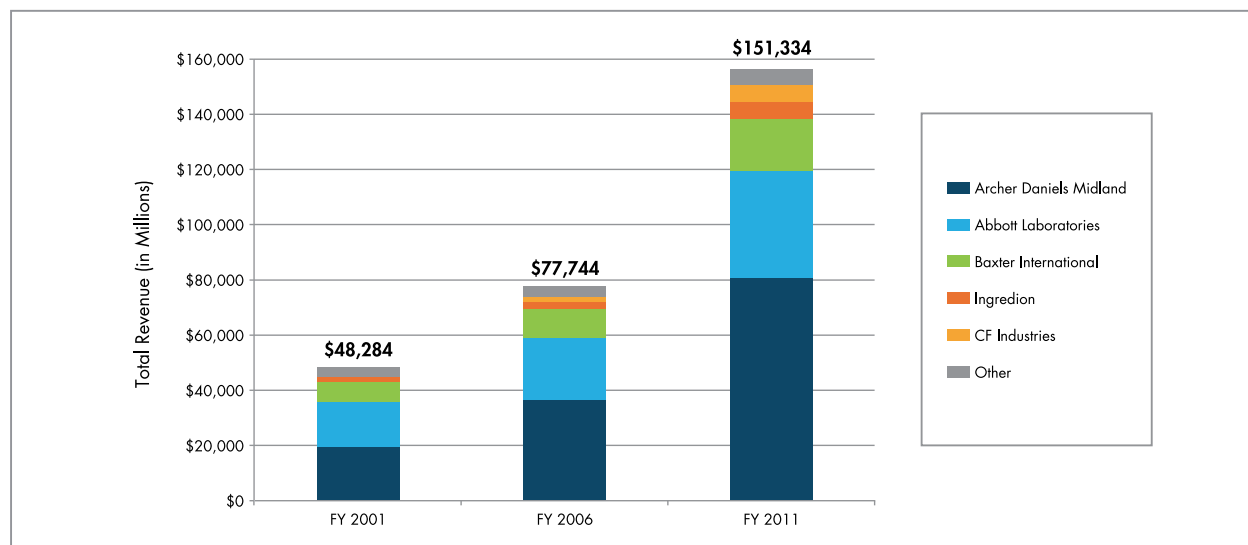
In Economic Output—\$52.4 Billion Direct, \$46.2 Billion Indirect/Induced

Simply put, the size of the biotechnology industry's contribution to the Illinois economy is huge. In 2011, the overall economic output of the industry was \$98.6 billion. This figure represents \$52.4 billion of direct output, plus an additional \$46.2 billion in indirect and induced output.

What does economic output represent? It is the broadest measure of economic activity and equivalent to sales for most industries. More specifically, it represents the sales related to biotechnology firms (direct output), as well as the suppliers and service-industry firms that benefit from the spending of biotechnology employees (indirect and induced output).

Revenue and revenue growth are also important indicators of economic activity. In this case, the biotechnology industry in Illinois has demonstrated the strongest revenue growth in recent years among all of the states analyzed in this study—an average annual growth of 13.3% from 2006 through 2011. Overall company revenue in 2011 totaled more than \$151 billion.

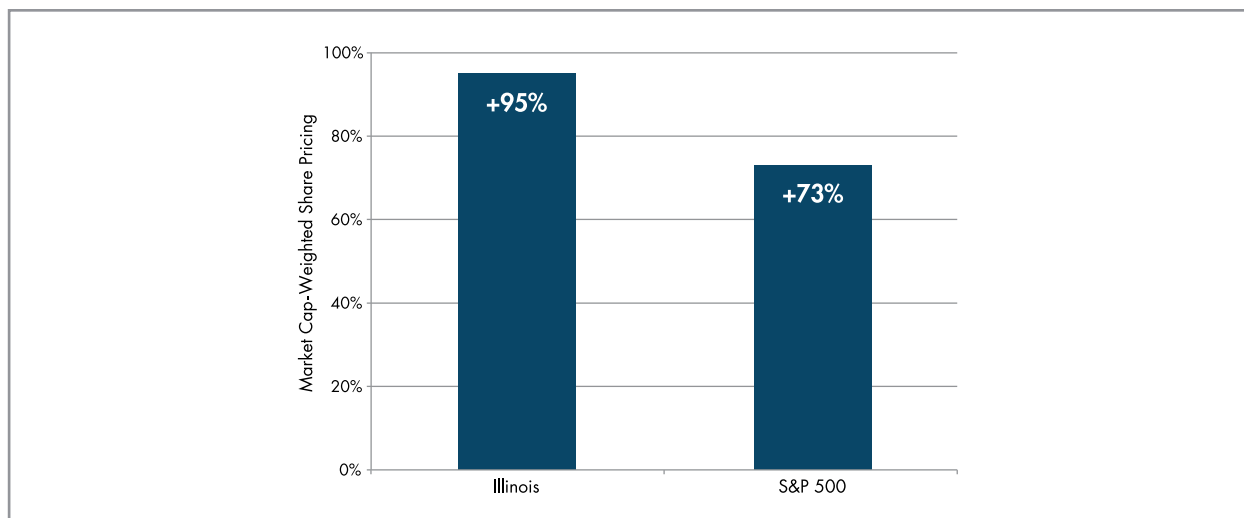
Illinois Biotechnology Company Revenue—2001–2011



The explosive growth of revenue in Illinois biotechnology has been driven by large multinational companies.

In addition to revenue growth, the stock market helps inform analysis of economic performance. In this case, stock prices for Illinois biotechnology firms have been especially strong, having significantly outpaced the S&P 500 since 2002.

Illinois Biotechnology Stock Performance vs. the S&P—2002–2012



Analysis based on stock performance of the top five public bioscience companies in Illinois. (ABT - Abbott Laboratories, BAX - Baxter International Inc., CF - CF Industries Holdings, Inc., ADM - Archer Daniels Midland Company and HSP - Hospira Inc.)

Significant state and local tax contributions: Biotechnology contributed \$2.9 billion in Illinois taxes alone in 2011, including taxes on indirect and induced activity. This figure represents \$1.1 billion in direct contributions and an additional \$1.8 billion of indirect and induced activity. The total amount is equivalent to 4.7% of state and local tax collections in the entire state.

Finally, other key indicators defining the economic impact of biotechnology in the Midwest Super Cluster include:

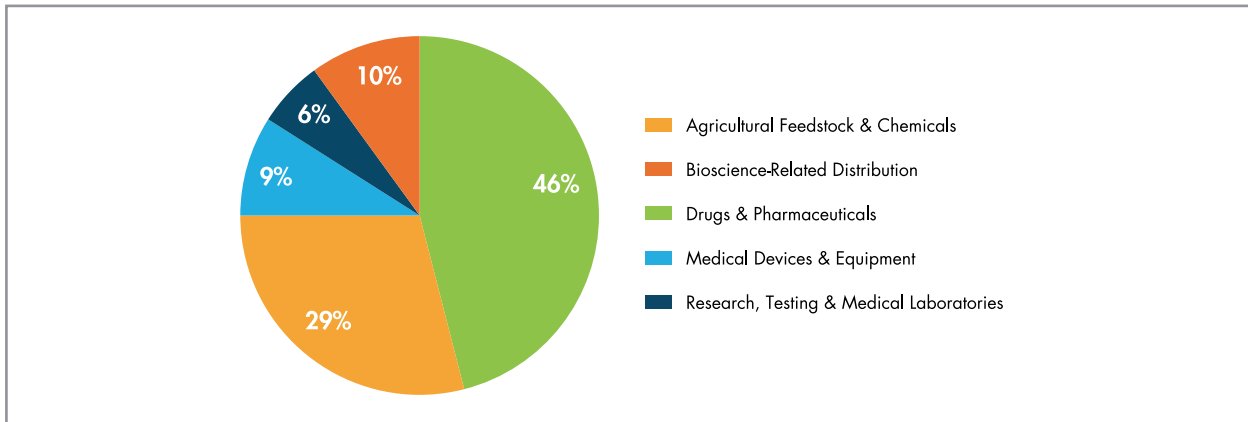
- High direct and indirect/induced economic outputs: for every \$1 of direct output generated from the biotechnology industry, the indirect and induced output contribution was \$1.88.
- Growth in pharmaceutical exports is strong as well, boasting an 8.4% CAGR from 2007–2011 and suggesting continued strong international growth and potential.



\$2.9 BILLION

In State & Local Taxes Paid in 2011—
\$1.1 Billion Direct, \$1.8 Billion Indirect/Induced

Total Economic Output by Illinois Biotechnology Segments—2011



The segments with the largest output contributions in 2011 were drugs and pharmaceuticals and agricultural feedstock and chemicals, with drugs and pharmaceuticals contributing almost half of the total output. Both segments also showed high average output per worker compared to other biotechnology segments as well as other industries in the economy as a whole.

What does all this economic data add up to? Not only do the large corporations of Illinois biotechnology contribute significantly to the Illinois economy, but these companies are continuing to grow and prosper despite the current and most recent economic conditions.

Investing in this vital industry yields a greater return by supporting a large service industry statewide, and contributing substantially to the economic health of local and state governments.

EVALUATING ILLINOIS EMPLOYMENT AND JOB CREATION

Illinois Biotechnology: Putting People to Work

Illinois is home to 3,572 biotechnology establishments that, as of 2011, directly employ 81,115 people. In addition, some 288,000 people are indirectly impacted by the biotechnology industry, working for suppliers and at firms such as restaurants and clothing stores, where biotechnology employees spend their earnings.

The total number of jobs generated by biotechnology in Illinois as of 2011 grew to more than 369,000. No small achievement in any economy.

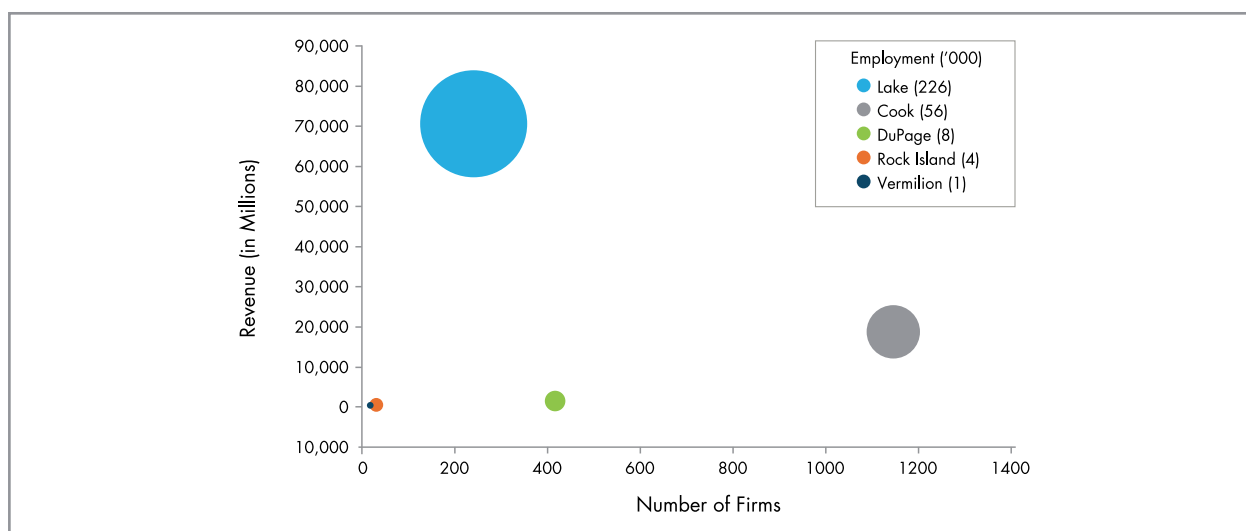


369,000 RESIDENTS

Employed & Impacted by Biotech—81,000 Direct Jobs, 288,000 Indirect/Induced

The geographical distribution of the biotechnology community is also diverse, with companies found in counties throughout Illinois. Of the top five counties in Illinois, Lake County hosts the greatest number of biopharma companies, and Cook County is primarily distinguished by its high concentration of device and diagnostic companies. DuPage County, Rock Island County and Vermilion County round out the top five in Illinois with a significant presence of agricultural and industrial firms.

Illinois Biotechnology Activity in the Top Five Counties

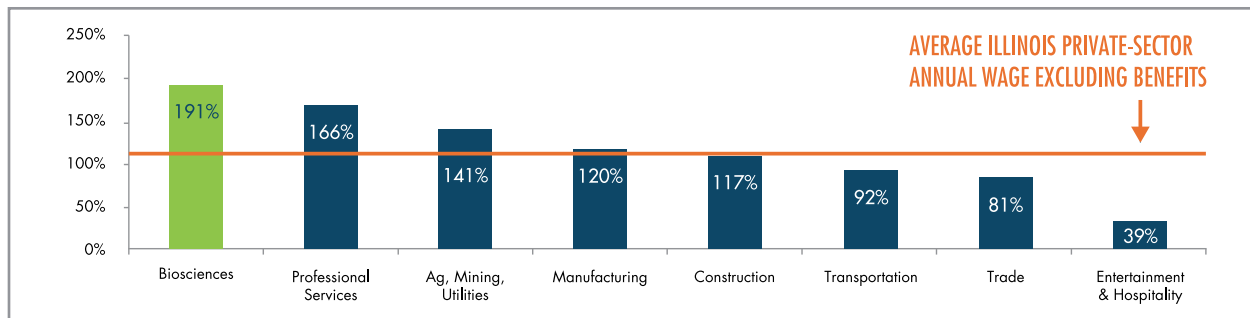


The biotechnology industry in Illinois is most concentrated in the counties of Lake, Cook, DuPage, Rock Island and Vermilion, with the greatest revenue being generated in Lake, and the highest number of firms located in Cook. Note: circle size above corresponds to employment ('000).

The sum totals of people and where they work only tell part of the story. Being employed is one thing. Being well-employed is another. **So what is the standard of living for all of these people?**

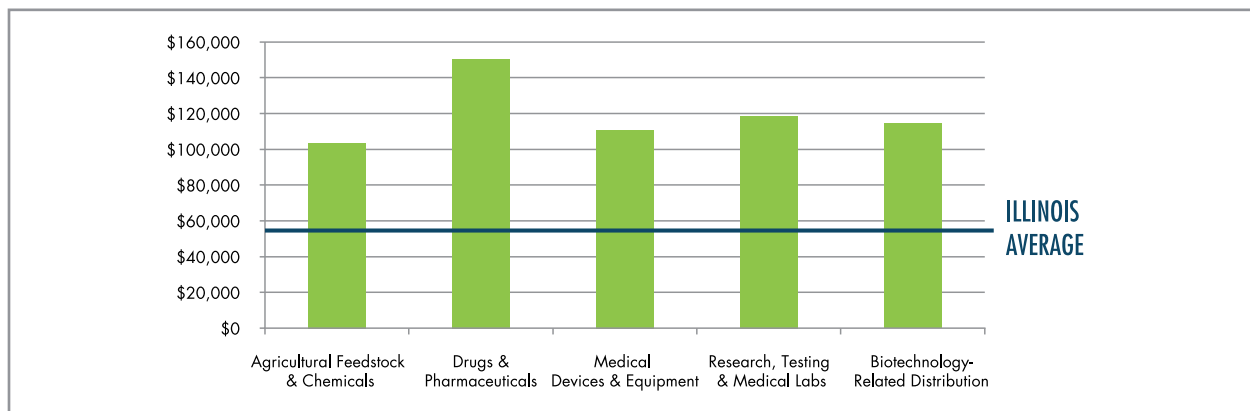
Illinois residents employed by biotechnology companies earn a staggering 91% more than the average Illinois resident, making \$97,293 per year versus about \$50,920 respectively (excluding benefits). In fact, the average total compensation (wages and benefits) of people working at biotechnology firms was \$121,616 in 2011.

Average Annual Wage by Industry – 2011



The bioscience industry average wage is more than \$97,000, exceeding the private sector average wage in Illinois by more than \$45,000.

Average Total Compensation by Biotechnology Segment – 2011



The average total compensation of biotechnology employees across all industry sectors is considerably higher than the Illinois private sector average (\$97,000 compared to \$51,000).

What's more, annual pay for those employed by the biotechnology industry continues to exhibit moderate growth despite the current economic climate.

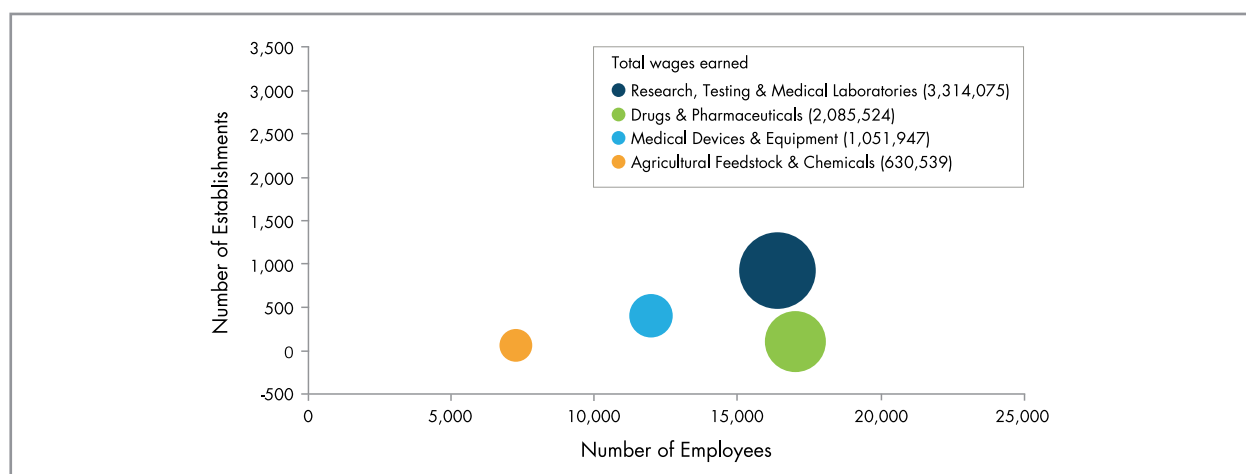
Some other highlights include:

- Direct, indirect and induced labor earnings for the bioscience industry totaled over \$26 billion in Illinois in 2011; equivalent to 4.7% of total (private and public sector) personal income.
 - Nearly \$10 billion in direct compensation, or 3.3% of private-sector compensation in Illinois.
- Annual gross economic output averages \$645,000 per worker in Illinois bioscience industries.
 - Well above the average for other industries.

“Illinois residents employed by biotechnology companies earn a staggering 91% more than the average Illinois resident...”

Within the specific segments, drugs and pharmaceuticals contributed the most to employment in 2011—providing more than 141,000 direct, indirect and induced jobs. Nearly 18,000 people were directly employed by drug and pharmaceutical firms, representing the second-largest population of these individuals in the United States, and 38% of the total Illinois employment contribution of the biotechnology industry.

Illinois Biotechnology Employees by Sector and Wages—2011



Research, testing and medical laboratories account for the largest portion of employment and wages in Illinois. The medical devices and equipment segment is also growing; however, it is primarily driven by growth of companies that produce surgical equipment and supplies. In addition the agricultural feedstock and chemicals segment demonstrated the strongest growth in Illinois biotechnology from 2001-2006. Note: circle size above corresponds to total wages earned.

The impact on human welfare is clear. Higher-than-average wage levels result in an above-average quality of life, generating remarkably attractive career options and employees who work hard and remain loyal to their companies, and contribute substantially to future corporate growth.

On a more global level, higher wage levels result in a higher economic multiplier. Biotechnology employees have higher-than-average spending power to fuel other businesses and contribute tax revenues for Illinois.

INTEGRATING ACADEMIA AND INDUSTRY

Multidisciplinary Cooperation: Key to Turning Ideas into Reality

In order to ensure the ongoing translation of discovery and innovation into commercial success for Illinois universities, their research and development departments and “industry partners” need to work together. Illinois research universities have recognized this need and are constantly working to adopt national best practices for commercial development of university innovation.

Universities therefore are increasingly developing partnerships with industry professionals and experienced entrepreneurs to connect academic researchers with funding sources and mentors critical to creating the best chances for success. But all of this cooperation would go for naught without significant investment into research by the universities, the catalysts for discovery and innovation.

The good news is that the seven top Illinois universities* have steadily increased their research and development expenditures. In fact, these expenditures have nearly doubled from 2001 (growing from \$727M to more than \$1.3B), and in the most recent five-year period for which data are available (2006-2010), they have grown some 25% despite the recent economic downturn.

Taken together, the Midwest Super Cluster allocated more research and development dollars in 2010 than any other region in the country.



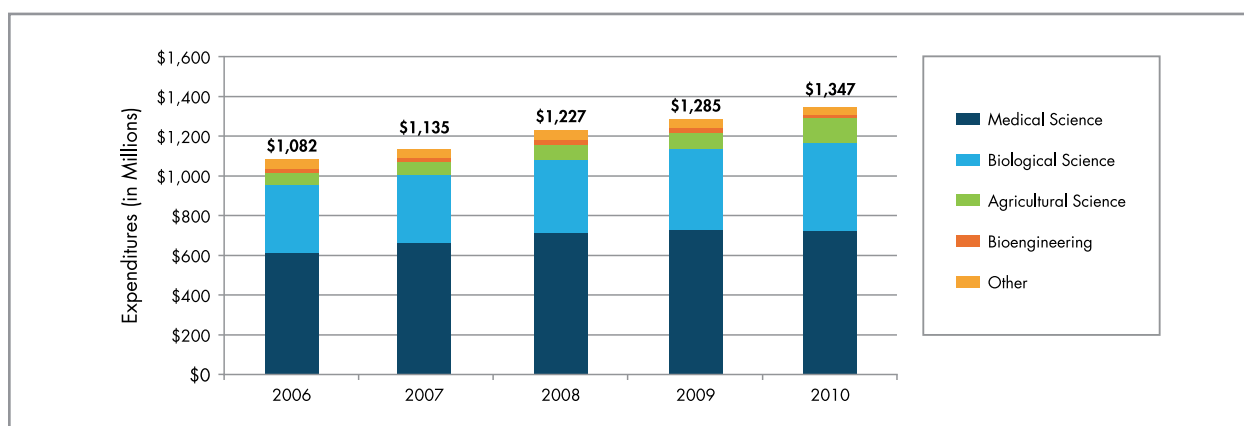
\$1.3 BILLION

In R&D Expenditures Among Seven Top Universities, Nearly Doubled Since 2001

“...the Midwest Super Cluster allocated more research and development dollars in 2010 than any other region in the country.”

*Northwestern University, University of Chicago, University of Illinois at Chicago, University of Illinois at Urbana-Champaign, Rush University, Southern Illinois University Carbondale, Loyola University and Southern Illinois University Edwardsville.

University Research and Development Expenditures in Illinois—2006–2010



Biological science and medical science continue to lead the pack in university research and development expenditures, while a 21% CAGR in agricultural science since 2006 suggests a vigorous level of interest in commercializing innovation in that field as well.

Top Illinois universities also are showing great progress toward capitalizing on their biotechnology research by generating new patents and increasing access for commercialization. In 2011, more than a dozen startup companies emerged from these universities to bring innovations to market.

BIOTECHNOLOGY PATENTS FILED BY TOP ILLINOIS UNIVERSITIES — 2011

Northwestern University	188
University of Illinois at Chicago	183
University of Illinois at Urbana-Champaign	166
Southern Illinois University	16

Top Illinois universities are at the forefront of biotechnology research and business startup development.

In Illinois and the Midwest, the interplay among high academic activity, funding and cooperation with industry is resulting in an exciting environment for biotechnology commercial developments.

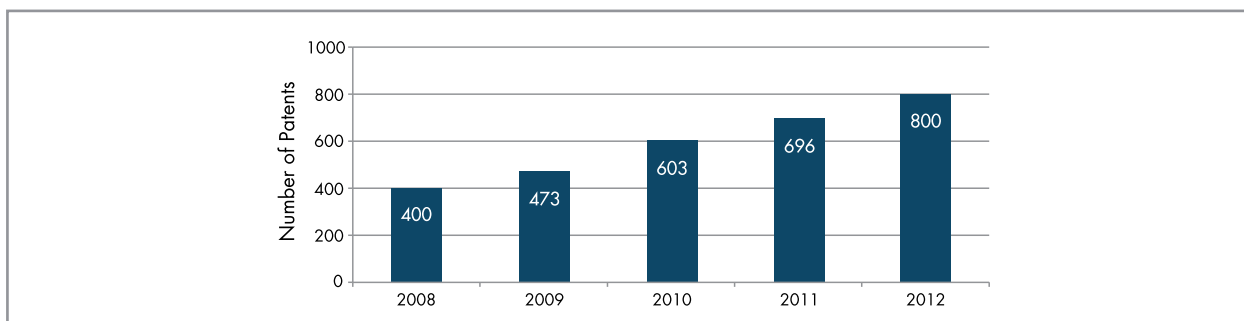
DRIVING ENTREPRENEURIAL AND STARTUP EFFORTS

Strength in Numbers: Widespread Financial and Intellectual Support

Industry startup efforts rely largely on the intellectual strength of academic resources as well as the availability of significant sources of funding.

Illinois is home to and surrounded by world-class research universities throughout the Midwest Super Cluster. These universities represent the foundation of an energized startup ecosystem.

Illinois Biotechnology Patents Published – 2008–2012



Illinois biotechnology has exhibited a high degree of growth in patents published over the past five years, with the number of patents published doubling over this period of time.

Growth in patent output across all biotechnology sectors since 2008 was substantial, suggesting that the intellectual property production of the industry remains strong and unaffected by the economic downturn. These increases were driven by a number of elements, including a rise in the number of tech transfer programs, innovation initiatives at local universities, a rebound in venture capital funding through gap funding programs and increases in federal funding for biotechnology efforts.

“Illinois is home to and surrounded by world-class research universities throughout the Midwest Super Cluster.”



209% INCREASE

In Illinois Venture Capital Funding from 2009-2012

It is true, of course, that healthcare venture capital as a whole, and access to early-stage funding, have been affected by the economic climate in recent years. As a result, startup companies often have had to respond to external funding shortfalls by utilizing internal cash flow to fund their early-stage development.

The good news is that this trend is starting to turn around, as shown by Illinois venture capital funding growing by 209% from 2009-2012. Illinois is leading the way in addressing this critical gap in funding by offering a number of industry- and state-sponsored programs to help biotechnology businesses of all sizes and in all areas of the Midwest.

Companies and universities are actively participating in and supporting community groups such as the PROPEL Center of the iBIO Institute and Chicago Innovation Mentors by providing funding for educational programming, mentors and subject matter experts. Numerous programs have been put in place to encourage small businesses to explore technology commercialization potential and provide assistance at a startup's earliest stages.

- PROPEL Center of the iBIO Institute, founded in 2007, is a group of programs aimed at increasing the number and success rate of early-stage life sciences companies in Illinois. PROPEL helps guide the development of formation-stage and early-stage life sciences companies by providing entrepreneurs with access to specialized resources and expertise to prepare them for early-stage funding. Since its inception in 2007, PROPEL has helped more than 80 companies who have raised over \$85M in funding.
- Chicago Innovation Mentors (CIM), established in November 2010, supports university-based and local new technology innovation ventures through the use of mentor teams to transition academic research and innovation into economically viable commercial efforts. The blend of academia and industry is evident in CIM's sponsors: Northwestern University, University of Chicago, University of Illinois, PROPEL Center of the iBIO Institute, Argonne National Laboratories and the Rehabilitation Institute of Chicago. CIM has grown to over 140 mentors and more than 50 ventures since its start over two years ago.

State-sponsored programs have also emerged to bridge the perceived gap in venture funding:

- **The Illinois Angel Investment Tax Credit Program** offers a tax credit to parties or firms that make an investment in one of the State's qualified new business ventures.
- **The Invest Illinois Venture Fund** is a new venture capital program established in 2011 to accelerate investments for small, innovative companies.
- **The Illinois Technology Development Account** encourages innovation, job growth and business expansion. With \$75 million invested in Illinois venture capital firms, the State has helped bolster the high-technology, venture and startup sectors in Illinois. Indeed, the TDA helped create and grow 26 Illinois companies, resulting in well-paying jobs in the State's technology sector.
- **The Illinois EDGE Tax Credit Program** is designed to offer a special tax incentive to encourage companies to locate or expand operations in Illinois when there is active consideration of a competing location in another State.

Illinois' large corporations are also helping to lead the way by deploying early-stage investment to the startup biotechnology community. Corporations such as Abbott/AbbVie, Astellas, Baxter International and Takeda have prioritized innovation in the region by significantly increasing the amount of funding and venture capital available to the Illinois community:

- Aggregate venture funding from all of these companies in the region has totaled \$700–800M over the past few years.
 - One particularly compelling example is the dramatic increase in a funding program at Astellas from \$927K in April–June 2011, to \$1.9M in the same period of 2012.

Filling out the picture of startup support in the Midwest Super Cluster is a variety of other communities outside of Illinois, such as Madison, Wisconsin and Cleveland, Ohio, who are providing premier organizations and best practices.

Examples include the Wisconsin Alumni Research Foundation (WARF) in Madison, considered by many of its Midwest peers as a model of commercialization. In addition, groups like BioEnterprise and JumpStart in Cleveland, Ohio serve as leaders in implementing assistance programs.

Across the entire Midwest Super Cluster, the financial support for such institutions and the rapidly accumulating experience of academic and business professionals are generating the factors needed to build a consistent pipeline of innovations and startup businesses.

“Illinois corporations have prioritized innovation in the region by significantly increasing the amount of funding and venture capital available...”

THE ECONOMIC ENGINE AS A WHOLE

Summary and Conclusions

As this report documents, Illinois is at the core of the most vibrant bioscience cluster in the United States, and the biotechnology industry has grown to become a major driver of the Illinois economy.

But more important than past accomplishments is the way the region is focusing on its challenges and opportunities to become recognized as one of the top biotechnology communities in the world.

Some of the most important potential areas that Illinois continues to pursue include:

- Consistently increasing funding for biotechnology research.
- Recruiting and nurturing life sciences talent needed to ensure ongoing growth.
- Continued emphasis on the acquisition of early-stage funding.

The benefits of these efforts are clear. The biotechnology industry in Illinois and the Midwest has a far-reaching and dramatic impact on the economy of the region. In addition, this impact is being actively fueled by both academia and industry.

- Thousands of jobs are being created, and the economic contribution of biotechnology companies and employees in the region is considerable.
- Illinois-based universities are recognizing the value and necessity of technology transfer programs to support the transition from academic research to commercialization.
- A growing number of industry- and state-sponsored programs are shaping the future by guiding startup companies toward success.

As this vital economic engine continues to surge forward, the country and world will increasingly recognize that Illinois and the Midwest are critical contributors to the global biotechnology landscape.



ILLINOIS IS AT THE CORE

of the most vibrant bioscience cluster in the United States

APPENDIX

Estimation Economic Contribution Approach

Total economic contributions (direct, indirect and induced) of the biotechnology industry were estimated using a combination of publicly available data and the 2010 IMPLAN economic model of Illinois.

- Publicly available data were used to estimate the following direct economic contributions of biotechnology:
 - The Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) provided estimates of employment and wages in the NAICS sectors that make up the biotechnology industry
 - State and local tax contributions were estimated using tax collections data reported to the U.S. Census in annual State and Local Finance surveys.
- IMPLAN was used to estimate direct output in the biotechnology industry plus the indirect and induced outputs:
 - Output (sales) was estimated using output per worker ratios by industry provided by IMPLAN. These ratios were compared to national ratios by industry estimates of the Bureau of Economic Analysis. Adjustments were made to certain industry segments to reduce output per worker data in the IMPLAN model, reflecting more conservative national averages.
 - IMPLAN is an “input-output” economic model. It identifies the complex flows from producers to intermediate and final consumers within a region in order to calculate a set of “multipliers” estimating the indirect and induced economic activity from spending and employment in the biotechnology industry. The state economic multipliers for indirect and induced impacts are driven by the input purchases by biotechnology firms in the state, the percentage of each type of commodity purchased within Illinois, and household consumption patterns of employees.

Relevant NAICS Codes by Segment

1. Agricultural Feedstock & Chemicals

- Wet corn milling (311221)
- Soybean processing (311222)
- Other oilseed processing (311223)
- Ethyl alcohol manufacturing (325193)
- Cellulosic organic fiber manufacturing (325221)
- Nitrogenous fertilizer manufacturing (325311)
- Phosphatic fertilizer manufacturing (325312)
- Fertilizer (mixing only) manufacturing (325314)
- Pesticide and other chemical manufacturing (325320)

2. Medical Devices & Equipment

- Electro-medical apparatus manufacturing (334510)
- Analytical laboratory instrument manufacturing (334516)
- Irradiation apparatus manufacturing (334517)
- Surgical and medical instrument manufacturing (339112)
- Surgical appliance and supplies manufacturing (339113)
- Dental equipment and supplies manufacturing (339114)

3. Drugs & Pharmaceuticals

- Medicinal and botanical manufacturing (325411)
- Pharmaceutical preparation manufacturing (325412)
- In-vitro diagnostic substance manufacturing (325413)
- Other biological product manufacturing (325414)

4. Research, Testing & Medical Laboratories

- Testing Labs (541380)
- R&D in biotechnology (541711)
- R&D in the physical, engineering and life sciences (except biotech) (541712)
- Medical laboratories (621511)

5. Bioscience-Related Distribution

- Medical, dental, and hospital equipment and supplies merchant wholesalers (423450)
- Drugs and druggists' sundries merchant wholesalers (424210)
- Farm supplies merchant wholesalers (424910)

Limitations of the Analysis

- The results show a snapshot of the economic contributions of the bioscience industry in 2011. The results cannot be used to evaluate the impact of an expansion or contraction of the industry.
- Employment estimates reflect the count of full-time and part-time workers, not full-time equivalents. This is standard practice in input-output models, which report employment impacts using this convention.
- Estimates are based on public information. Ernst & Young interviewed bioscience firms about the industry overall, but did not verify government estimates. No firm-specific employment, sales, wage, or tax information was provided by firms in the bioscience industry during interviews, although these companies validated certain supply-chain patterns and other industry characteristics that were reflected in the estimates.
- Local purchases in the state are based on estimates. A key factor in determining the size of indirect economic contributions is the amount of inputs that an industry buys from local businesses. This analysis relies on estimates of the locally purchased inputs from the IMPLAN model, which are estimated using aggregate trade flow data.

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About Illinois Biotechnology Industry Organization (iBIO)

iBIO's mission is to make Illinois and the surrounding Midwest one of the world's top life sciences centers: a great place to do business and a great place to grow new technology ventures. iBIO advocates for sound public policy at the local, state and federal levels, improves our region's ability to create, attract and retain businesses, and orchestrates industry involvement to help restore America's leadership in math and science education.

www.ibio.org

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The Illinois Science & Technology Coalition is a member-driven, non-profit organization that cultivates and attracts research and technology-based investment, talent and job growth in the state. Through sector-driven, public-private partnerships, advocacy efforts and project management, we connect government, academia and industry to leverage the state's world class assets for maximum economic impact to enhance Illinois' position as a global hub for research, innovation and entrepreneurship.

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